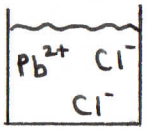
Calculate the conc of Cl^- ions if $PbCl_2$ contains $0.0162\ mol\,L^{-1}$ of Pb^{2+} ions



$PbCl_2$

$Pb^{2+}\ Cl^-$

Cl^-

1 : 2

$0.0162 : 2 \times 0.0162$

ans; $0.0324\ mol\,L^{-1}$

Calculate K_s if conc. of Pb^{2+} is $0.0162\ mol\,L^{-1}$

$K_s = [Pb^{2+}][Cl^-]^2$

$= (0.0162)(0.0324)^2$

$= 1.7 \times 10^{-5}$

Given $K_s = 1.81 \times 10^{-10}$ of AgCl, find the conc of Ag^+

$K_s = [Ag^+][Cl^-]$

$= x \cdot x$

$= x^2$

$\sqrt{K_s} = x$

ans: 1.35×10^{-5}

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given $K_s = 1.7 \times 10^{-5}$ find the conc of Pb^{2+} ions in $PbCl_2$

$K_s = [Pb^{2+}][Cl^-]^2$

$= x \quad 2x^2$

$= 4x^3$

$\sqrt[3]{\frac{K_s}{4}} = x$

Solubility product (K_s)

$MgCl_{2(s)} \rightleftharpoons Mg^{2+}_{(aq)} + 2Cl^-_{(aq)}$

$K_s = [Mg^{2+}][Cl^-]^2$

Ionic product (IP)

the product of the ions raised to the power of their mole ratios

a solution of magnesium chloride

ionic product $= [Mg^{2+}][Cl^-]^2$

(aka Qs - Reaction quotient)

if IP > Ks ppt occurs

if IP = Ks have a saturated solution

if IP < Ks no ppt

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the "common ion" effect - precipitation can occur ie solubility decreases if an ion is added to a solution that already contains that ion

Calculate the solubility of $Fe(OH)_2$ in $0.05\ mol\,L^{-1}$ of NaOH

K_s of $Fe(OH)_2 = 4.1 \times 10^{-15}$

$K_s = [Fe^{2+}][OH^-]^2$ assume $[OH^-] = 0.05\ mol\,L^{-1}$

$4.1 \times 10^{-15} = [Fe^{2+}](0.05)^2$

$\frac{4.1 \times 10^{-15}}{(0.05)^2} = [Fe^{2+}]$

$1.64 \times 10^{-12}\ mol\,L^{-1}$

Calculate the solubility of AgCl in $0.1\ mol\,L^{-1}$ NaCl. $K_s = 1.56 \times 10^{-10}$

assume $[Cl^-] = 0.1\ mol\,L^{-1}$ $K_s = [Ag^+][Cl^-]$

$\frac{1.56 \times 10^{-10}}{0.1} = [Ag^+]$

ans; 1.56×10^{-9}

Consider whether a ppt will occur if 150ml of 0.01m Na_2CO_3 mixed with 150ml of 0.005m $MgCO_3$. $K_s\ (MgCO_3) = 2 \times 10^{-15}$

$[Mg^{2+}] = \frac{0.005}{2} = 0.0025$ $\quad [CO_3^{2-}] = \frac{0.005}{2} + \frac{0.01}{2} = 0.0075$

IP Ks

ppt

$IP = [Mg^{2+}][CO_3^{2-}] = 0.0025 \times 0.0075 = 1.88 \times 10^{-5}$